REMARKS

The Office Action dated November 25, 2008 has been received and carefully noted. The preceding amendments and the following remarks are submitted as a full and complete response thereto. Claims 1 and 36 have been amended to define the subject matter more clearly. Support for the amended claims 1 and 36 can be found throughout the specification, for example, at page 16, [0038]. Claims 47-50 have been added. Support for claims 47 and 49 can be found in original claim 6 and throughout the specification, for example, at page 4, [0008]. With respect to support for claims 48 and 50, please see the argument in response to the rejection for lack of written description because while the reference to "outer" surface has been removed from claims 1 and 36, new claims 48 and 50 recite that the surface of the support is an outer surface. No new matter has been added with the amendments of claims. Claims 22-35 have been withdrawn from consideration in response to the restriction requirement. Applicants reserve the right to pursue these claims in a divisional application or if there is an allowable generic or linking claim. Claims 1-21 and 36-50 are pending in this application. In view of the foregoing claim amendments and the following remarks, reconsideration of all the rejections is respectfully requested.

I. Rejection of Claims 1-21 and 36-40 under 35 U.S.C. §112, First Paragraph

The Office has rejected claims 1-21 and 36-40 for lack of written description alleging that the previous amendments of claims 1 and 36 to add the limitation of "outer"

in relation to a surface of the support introduced new matter. Applicants respectfully disagree.

At the outset, the term "outer" has been deleted from claims 1 and 36 and thus, this rejection becomes moot. However, Applicants still address this rejection because new claims 48 and 50 recite the deleted term "outer" in relation to a surface of the support.

Applicants respectfully submit that the specification as originally filed provides ample support for claims 48 and 50. Applicants would like to direct the Office's direction to the original claims 31 and 35, paragraphs [0011], [0014] and [0015], and Figs. 2A, 2B and 3A to 3C. Thus, considering the explicit disclosure and drawings contained in the application originally filed, one skilled in the art would have understood that the subject matter of new claims 48 and 50 were in possession of the inventors at the time of the filing of the present application. Thus, new claims 48 and 50 do not introduce new matter and do not raise any written description issue.

II. Rejection of Claims 1-12, 14, 17-19 and 36-40 under 35 U.S.C. §102

The Office has maintained the rejection of claims 1-12, 14, 17-19 and 36-40 as anticipated by Singaram et al. (U.S. Patent Publication No. 2002/0106810: Singaram) and evidenced by Kwok et al. Applicants respectfully disagree.

At the outset, Applicants note that the Office appears to recognize that the teaching of IPN hydrogels in Singaram is not relevant to the claimed method because,

as shown in Fig. 4A, dye polymer chains are introduced throughout the allegedly supported quencher polymer in the IPN hydrogels. See pages 3-4 of the Office Action. However, the Office seems to take a position that the teaching of Singaram relating to semi-IPN hydrogels is still relevant to the claimed method based on the reasoning that dye polymer chains are not introduced throughout the allegedly supported quencher polymer and thus can be relegated to the outer surface. Id.

Applicants respectfully submit that neither the IPN hydrogel nor the semi-IPN hydrogel taught in Singaram is relevant to the claimed method regardless of recitation of "outer" in relation to a surface of the support, as amended in claims 1 and 36. Singaram defines the term "IPN" as a combination of two or more "network" polymers synthesized in juxtaposition and describes how to make the IPN polymer hydrogels. See paragraphs [0143] and [0176]. According to Singaram, a network comprising the quencher is formed and then the network is swollen with a mixture of monomers including the dye monomer and a second polymerization is carried out. Id. Therefore, in Singaram, the IPN is formed between a polymer containing a quencher moiety and a polymer containing a dye moiety. Since both the quencher and dye moieties are sensing moieties, the IPN polymer hydrogel taught in Singaram corresponds to a macromolecular indicator of the claimed invention. This is the same case with respect to the semi-IPN hydrogels formed with polymeric quenchers and polymeric dyes.

Applicants also note that the Office recognized that the term "macromolecular indicator" set forth in claims 1c, d and 36c, d is broad enough to embrace the polymeric

quenchers as well as polymeric dyes. See page 4 of the Office Action. Therefore, both the IPN and semi-IPN structures of Singaram are formed with two indicator polymers without any involvement of a surface of the support. Thus, Singaram does not teach or suggest at least steps (a), (b), (d) and (e) of the claimed method.

However, in view of the Office's reference to "supported" quencher polymer in the Office Action, the Office might have understood that the quencher polymer corresponds to the support of the claimed method. However, even under the assumption that only the quencher polymer were to correspond to the support of the claimed invention, neither of the IPN and semi-IPN hydrogel disclosed in Singaram is relevant to the claimed method.

In the IPN hydrogel of Singaram, the dye polymer as well as the quencher polymer functions as a network polymer, as defined in paragraph [0143], and thus the dye polymer cannot be introduced only to a surface of the quencher polymer network, but rather throughout the quencher polymer network.

With respect to the semi-IPN hydrogel, the Office heavily relies on the method for producing the semi-IPN hydrogel described in paragraph [0177] to support its rejection. Thus, Applicants set forth below in more detail the distinction between the claimed method and the method disclosed in paragraph [0177] of Singaram.

Paragraph [0177] describes two ways to make a semi-IPN hydrogel:

> The semi-IPN hydrogel is formed by dissolving a soluble polymer containing dye moieties in a mixture of monomers including a quencher monomer and polymerizing. Alternatively, a soluble quencher polymer is

> dissolved in a monomer mixture containing the dye monomer and the mixture polymerized. In either case, the molecular weight of the soluble component must be sufficiently high. . . that it cannot diffuse out of the network, i.e., it becomes physically bound to or trapped by the matrix.

See Paragraph [0177] (emphasis added).

Singaram defines "semi-IPN" as a combination of polymers in which one polymer is soluble and the other polymer is a network. According to paragraph [0177], the network of the semi-IPN in Singaram is formed from a monomer mixture. This process, thus, indicates that in the semi-IPN hydrogel of Singaram, a high molecular weight dye polymer or quencher polymer is trapped into a network during the formation of the network from monomers including quencher monomer or dye monomer. Example 12 further supports the description of the paragraph [0177] that the monomer solution containing quencher monomer, 4-N-(benzyl-3-boronic acid)-4'-N-(benzyl-4-ethenyl)-dipyridinium bromide chloride, is polymerized to trap soluble dye polymer, HPS-PEG, resulting in a thin film copolymer. Thus, paragraph [0177] simply does not teach or suggest introducing a dye or quencher polymer after the network formation is completed as in the claimed method.

In contrast, in the claimed methods a macromolecular indicator or a monomer thereof is interlaced into the surface of the support that is a polymeric structure which is already prepared.

In this regard, Applicants note that while not in the context of the semi-IPN, Singaram describes that "reactive moieties are coupled to an already prepared matrix",

but using "a post polymerization reaction," that is, a reaction after polymerization. See Paragraph [0170]. Still, however, it does not teach or suggest changing the integrity of the polymer of the support as in step (b) of claims 1 or 36.

As explained in the previous Response, while Singaram states that the semi-IPN hydrogel thus obtained is mounted in or attached to a support, it lacks teaching or suggestion as to how to do it. For example, Singaram states that "the sensing polymers are bound to a surface such as the surface of a light conduit." See Paragraph [0169]. Singaram also teaches that "[a] sensing polymer is mounted in the cell such that it is exposed on one surface to the excitation light and on the other to the process stream." Furthermore, Figure 8 clearly shows that the sensing polymer containing the dye and quencher is attached to a support. However, nowhere does Singaram teach or suggest how to attach or mount the sensing polymer (hydrogel matrix) to or in the surface of the support.

In contrast, in the claimed method, the integrity of the polymer of the surface of the support is changed to provide loosened polymer chains and the macromolecular indicator interlaces with the interlacing area on the surface that is formed from the loosened polymer chains. Thus, even assuming the "supported" quencher polymer referred to in the Office Action were to correspond to the support in the claimed method, as alleged by the Office, Singaram fails to teach or suggest changing the integrity of the polymer on the surface of the support to introduce a macromolecular indicator or a

monomer thereof into the surface. Therefore, Singaram fails to teach or suggest steps (a), (b), (d) and (e) of claim 1 and claim 36.

Applicants note that with respect to step (b), the Office alleges that since Singaram teaches HEMA as a type of polymer in paragraph 0163, Singaram teaches "loosening by a solvent such as HEMA of the dye polymer in paragraph 0177." In addition, as for step (e), the Office alleges that "Singaram et al. teach tightening by polymerization of the quencher (macromolecular indicator) in paragraph 0177." However, this is a misinterpretation of the disclosure in paragraph [177]. In the semi-IPN disclosed in Singaram, a soluble dye or quencher "polymer" is trapped into a network while the network is being formed from polymerization of a mixture of monomers, not the other way around. For example, what paragraph [0163] of Singaram teaches is that the dye polymer can be a soluble dye copolymer resulting from polymerization of N,N',N"-tris-(1-aminopropyl-- 3-methacrylamide)-8-acetoxy-pyrene-1,3,6-tris-sulfonamide with HEMA (which is a monomer). Thus, when this soluble dye copolymer is used, first, HEMA is not in monomeric form anymore and second, there is no polymer network that can be loosened because the network is being formed by copolymerization of a mixture of monomers containing a quencher monomer. Even when a soluble quencher polymer is used with a mixture of monomers containing HEMA and N,N',N"-tris-(1-aminopropyl-- 3-methacrylamide)-8-acetoxy-pyrene-1,3,6-tris-sulfonamide with HEMA, HEMA does not function to loosen the quencher polymer, but rather is used to form a dye polymer network into which the quencher polymer is

trapped. Thus, "polymerization of the quencher in paragraph 0177" referred to in the Office Action does not result in tightening the loosened polymer chains on the surface of the support since there is no loosened polymer on the surface of the support from the beginning during the formation of the semi-IPN in Singaram. Instead, in Singaram, it only results in forming a quencher polymer network into which a dye polymer is trapped during the formation of the quencher polymer network.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP 2131. Because Singaram fails to teach or suggest each and every element of the claimed method (claims 1 and 36), Singaram does not qualify as an anticipatory reference. The remaining rejected claims are dependent from either claim 1 or 36. Since the independent claims 1 and 36 are not anticipated by Singaram, the remaining dependent claims, which by definition incorporate all the elements of the claims 1 and 36, are not anticipated by Singaram. Accordingly, reconsideration and withdrawal of the anticipation rejection are respectfully requested.

III. Rejection of Claims 1-21 and 36-40 under 35 U.S.C. §103(a)

The Office Action also has rejected claims 1-12, 14, 17-19, 36-40 plus 41 and 44, and 13, 15-16, 20-21 plus 42, 43, 45 and 46 as being obvious over Singaram in view of Daniioff et al. (U.S. Patent Application 2002/0090734: Daniioff) with evidence provided

by Kwok et al. (2002 Polymer 45:4017-4027) and Colvin et al. (U.S. Patent Application 2004/0013204: Colvin). Applicants respectfully traverse.

As explained above, Singaram fails to teach or suggest (1) providing a support having a surface which comprises at least one polymer; (2) changing the integrity of the polymer to provide loosened polymer chains that form at least one interlacing area on the surface of the support; (3) causing the macromolecular indicator to interlace with said at least one interlacing area on the surface of the support, or causing the sequential polymerization of said monomers to form polymerization products which interlace with said at least one interlacing area on the surface of the support; and (4) causing the loosened polymer chains to tighten to produce surface immobilized indicator molecules. Moreover, Singaram is silent about the need of interlacing the polymer of the surface of the support and the macromolecular indicator so that a primary function or characteristic of the support are substantially preserved after immobilization. Therefore, Singaram would not have motivated one skilled in the art to come up with the claimed method. Furthermore, Singaram fails to teach swelling the polymer on the surface of the support to interlace the polymer with the macromolecular indicator. Absent any contrary evidence, therefore, one skilled in the art taught by Singaram would not have had a reasonable expectation of success of interlacing the macromolecular indicator directly with the polymer of the outer surface of the support.

The secondary references, Daniloff and Colvin, do not cure the deficiency of Singaram. Daniloff was cited as prior art disclosing an indicator molecule comprising

bis-carboxylate bi-boronate-anthracene. Colvin was cited as prior art which evidences that an optical sensing polyhydroxyl substituted polymer of Singaram comprising a bis-carboxylate bi-boronate-anthracene of Daniloff would contain at least some excimer regions.

However, none of these secondary references teach or suggest non-covalently attaching a macromolecular indicator to a support by interlacing the polymer of the surface of the support and the macromolecular indicator. Moreover, these references are silent about the need of interlacing the polymer of the surface of the support and the macromolecular indicator so that a primary function or characters of the support are substantially preserved after immobilization. Furthermore, these references fail to teach that the polymer on the outer surface of the support can be swollen to interlace it with the macromolecular indicator. Therefore, absent contrary evidence, one skilled in the art would not have had a reasonable expectation of success of interlacing the macromolecular indicator directly with the polymer of the surface of the support. Accordingly, even considering these references, the cited prior art references fail to motivate one skilled in the art to invent the claimed method with a reasonable expectation of success.

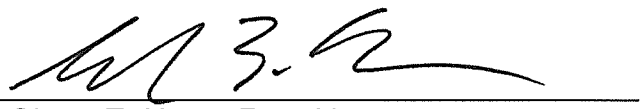
As explained above, the prior art references, alone or in combination, also fail to teach or suggest all the claim limitation of the rejected claims. Therefore, Applicants respectfully submit that the Office fails to establish a *prima facie* case of obviousness.

Accordingly, reconsideration and withdrawal of the obviousness rejections are respectfully requested.

In light of the foregoing, Applicants believe that the all pending rejections have been overcome, submit that the instant application is in condition of allowance and respectfully request the allowance of the instant application.

If any additional fee is due in connection with the filing of this Response, please charge such fee to Deposit Account No. 02-2135.

Respectfully submitted,

By 

Glenn E. Karta, Reg. No. 30,649
Attorneys for Applicants
ROTHWELL, FIGG, ERNST & MANBECK, p.c.
Suite 800, 1425 K Street, N.W.
Washington, D.C. 20005
Telephone: (202)783-6040

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